## REMARKS

Claims 1-9, 14 and 31-40 are currently pending.

**Amendments to the Drawings**

The objection to the drawings is overcome by the amendment of Figs. 1 and 2 described above. In addition, Applicants submit a full set of formal drawings to replace the drawings now on file.

**Amendments to the Specification**

The specification has been amended to include reference numbers for the columns, wire screen (both are shown in Fig.1) and rebar-type elements (shown in Fig. 2).

**General Considerations**

This invention relates generally to mine doors and more particularly to mine door leafs for relatively large mine doors. A mine door leaf of the present invention has a central core of a solidified composition and outer panels on opposite faces of the core. The core has a force-transmitting relationship with the panels resulting in an integrated stress-resistant structure. As a result, the mine door leaf is relatively lightweight for its size and is resistant to stresses of the type encountered in a mine environment.

**Rejection of Claims**

**Claim 1**

Claim 1 is directed to a mine door leaf **mounted in a mine passage** and comprising:

a) a central core of a solidified composition,

b) outer panels on opposite faces of the core,

c) the core having a force-transmitting relationship with the panels constituting the panels and core as an integral stress-resistant structure resistant to stresses **to which the door leaf is subjected in a mine**, including torsion-induced stresses, shear and bending stresses, and stresses induced by its own weight, and

d) one or more hinge components on the leaf.

Claim 1 stands rejected as obvious in view of U.S. Patent No. Re 36,853 (Kennedy '853) and U.S. Patent No. 6,481,179 (Zen).

Kennedy '853 discloses in Fig. 1 a mine door system having a door frame, a mine door hingedly mounted on the door frame, and a column contractible heightwise without loss of structural integrity to accommodate a convergence of the ceiling or floor of the passageway without any substantial deformation of the door frame. As mentioned by the Examiner, Kennedy '853 fails to disclose a mine door comprising outer panels and a central core of a solidified composition. Moreover, Kennedy fails to suggest such a door.

Zen discloses in Figs. 1 and 2 a frame 2 for a steel clad door comprising a pair of jamb members 5, a header 6 and a sill 7 molded from a composite material. Each of the frame members 5, 6, 7 is channel shaped having a bottom wall 8, 17, 18 and two sidewalls 9, 19, 20. In addition, the jambs have reinforcing diagonal members 12 extending between their sidewalls 9 and longitudinal grooves 21 in the exterior face of the bottom walls 8 for receiving inturned edges 22 of steel cladding panels 3 thereby attaching the panels 3 to the frame 2. Once the panels 3

are mated with the frame 2, the interior can be filled with insulation 4, such as polyurethane. Zen does not teach or suggest that a foam-filled door would be strong enough for use in a mine.

Applicants' mine door, as defined by claim 1, is designed to be both strong and lightweight. Strength is needed so that the mine door can withstand the substantial air pressure forces exerted on a door in a mine. For example, the ventilating air in a mine creates substantial air pressure differentials across a closed door, one side of the door being at a relatively higher pressure and the other side at a relatively lower pressure. This differential creates substantial stresses in the door. Also, a mine door is subjected to concussive air forces resulting from intentional or unintentional roof collapses and explosions in the mine during the mining process. Concussion is not simply a single pressure from an expansion of gases or the movement of rock. As an explosion occurs at the mine face, for instance, the pressure is raised locally by the expansion of the explosive gases. Initially there is a shock wave causes by movement of air away from the site of the explosion. This movement creates a vacuum at the site of the explosion, which eventually causes the air to reverse direction toward the center of the explosion. This expansion and contraction of the air repeats in decaying cycles and subjects a mine door to repetitive push and pull forces. If the door is not resistant to such forces, it will fail.

In addition, mine doors are typically mounted in cantilever fashion, leaving each door leaf unsupported along its free vertical side (except where it contacts the lintel of the doorway frame) and along its lower edge (except where it is attached to the doorway frame), as shown in Fig. 10 of the pending application, for example. As a result, a mine door leaf is subjected to torsional forces and is prone to flex if not rigidly constructed. Flexing must be avoided, since this can lead to

failure of the door, or at least deformation at the unsupported side of the door sufficient to cause substantial leakage past the door. Such leakage can have adverse consequences in terms of increased costs and ventilation problems. Structural strength and rigidity is also important so that the door can withstand the substantial forces required to open and close the door due to the air pressure differentials discussed above, and further to withstand the substantial abuse a door takes in a mine from passing equipment and personnel.

A lightweight door is also important for several reasons. First, a heavy door includes extra materials and therefore is more expensive. Second, a heavy door has more inertia than a lighter door, thus requiring greater opening and closing forces. In addition, heavy doors are harder to stop when moving, which can create risks to people and equipment around the door. Thirdly, a heavy door is more difficult to transport, handle and install. Applicants' door is strong, lightweight and suitable for use in a mine.

Zen, on the other hand, discloses a conventional steel clad door having an insulating material as its core. As mentioned above, Zen does not disclose or suggest using the insulating material for any purpose but to insulate the door. Accordingly, Zen fails to show or teach a door having panels and core that combine to form an integral stress-resistant structure resistant to stresses to which the door leaf is subjected in a mine, including torsion-induced stresses, shear and bending stresses, and stresses induced by its own weight. As a result, one of ordinary skill in the art would have no suggestion or motivation to combine the teachings of Kennedy '853 with Zen in developing the claimed invention.

In order to establish a prima facie case of obviousness based on a combination of prior art references, an examiner must set forth some suggestion or motivation to combine the teachings of the prior art references, either in the references themselves

or in the knowledge generally available to one of ordinary skill in the art at the time of the invention.[1] This requirement is justified because virtually all inventions are combinations of old elements.[2] Thus, if identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue.[3] Since there is no suggestion or motivation to combine Kennedy '853 with Zen, a prima facie case of obviousness based on a combination of Kennedy '853 and Zen has not been established. Thus, claim 1 is submitted as non-obvious and patentable over the references of record including Kennedy '853 and Zen.

Claims 2-9, 14 and 31-37 depend from amended claim 1 and are believed to be allowable for the same reasons as claim 1.

Claims 2 and 33 recite a mine door leaf wherein the force-transmitting relationship is established by adhesion and mechanical coupling or by mechanical coupling of the core to the panels. Similarly, claims 7 and 36 recite a mine door leaf wherein the force-transmitting relationship is established by adhesion and mechanical coupling or by mechanical coupling of the filling to the door panels. Zen also does not teach a door leaf where a force-transmitting relationship is established by mechanical coupling of the core (or filling) to the panels. In Zen, the panels 3 have inturned edges 22 which are secured to grooves 21 in the bottom wall 8 of the jamb members 5. No mechanical devices are used to secure the insulation 4 to the panels 3 probably because its purpose is to provide insulation and not strength to the door. As a result, the references fail to teach each and every element of Applicants' claimed invention. Accordingly, claims 2, 7, 33 and 36 are patentable for these additional reasons.

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[1] MPEP § 706.02(j).
[2] Environmental Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 698, 219 U.S.P.Q. 865 (Fed. Cir. 1983), cert. denied 464 U.S. 1043.
[3] Id.

Claims 34 and 37 recite that the mine door leaf further comprises a mechanical coupling device for mechanical coupling of the core (or filling) to the panels. The mechanical coupling device comprises at least one of wire screen and rebar-type elements. As mentioned above, Zen does not teach or suggest mechanical coupling of the core (or filling) to the panels. Accordingly, Zen cannot teach or suggest the use of either wire screen or rebar-type elements. Accordingly, claims 34 and 37 are patentable for these additional reasons.

Claims 38-40 are directed to a mine door installation including a door leaf of generally laminar construction. To the extent claims 38-40 include the same recitations as claims 1, 33 and 34, respectively, the claims are patentable for the same reasons discussed above with respect to claims 1, 33 and 34.

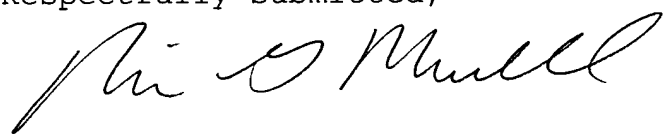
**CONCLUSION**

In view of the foregoing, Applicants respectfully request reconsideration and allowance of the application.

Applicants do not believe any fee is required by the timely submission of this response to the final Office action. The Commissioner is authorized to charge any fee deficiency or credit any overpayment to Deposit Account No. 19-1345 in the name of Senniger, Powers, Leavitt & Roedel.

The Examiner is invited to telephone the undersigned if the Examiner feels that a telephone interview might expedite allowance.

Respectfully submitted,



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